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Identifying and Solving Human Performance Problems in the Ammunition Transaction Report Processes in the Submarine Environment

ABSTRACT

This paper describes an effort where the Human Performance Systems Model (HPSM) was used to identify performance problems with the Ammunition Transaction Report (ATR) processes in place within the submarine community. ATRs are used to provide ordnance transaction information (e.g. what it is, where it is and what is its condition) via Naval Message to the authoritative database called CAIMS (Consolidated Ammunition Information Management System) maintained by NOLSC (Naval Ordnance Logistics Support Center). Following accurate assessment of the root causes of the performance deficiencies, a process was developed and tested that overcame the unique challenges associated with ATR reporting from a submarine. This case study describes the challenges submarine personnel face when trying to meet the objectives of a system that uses an interface and process that is not efficient or effective for a certain performer group. In this respect, solving the overall human performance problems partially involve changes to the human systems integration aspects of the system.

INTRODUCTION

This paper describes a case study where the rigorous methodologies of the Human Performance Systems Model (HPSM) were used to identify areas where process improvement could be realized in the Ammunition Transaction Reporting (ATR) system. While the basic principles of performance improvement are not new, the application of rigorous standards in the analysis process and strict adherence to three basic characteristics make the HPSM particularly effective as a systems approach for solving human performance problems. Those characteristics include: (1) Systematic and data driven analysis; (2) Needs based versus wants based performance drivers; and (3) Focus on accomplishments (results) of performance versus behaviors during performance. The figure below illustrates the simplified process.
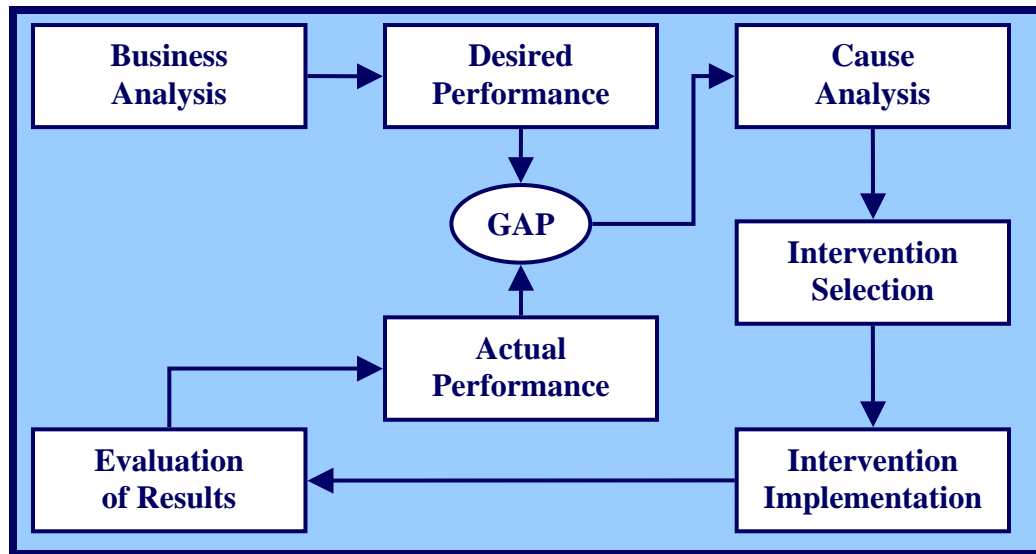
FIGURE 1. Human Performance Systems Model (Simplified)

Ammunition Transaction Reports (ATRs) are used to report conventional ordnance transfers to the Naval Operational Logistics Support Center (NOLSC). ATRs are usually generated and formatted automatically by the ordnance accounting software program called ROLMS (Retail Ordnance Logistics Management System). Information from the ATR is used to track the location and condition of all tracked conventional ordnance in the Navy worldwide in the Conventional Ammunition Integrated Management System (CAIMS) database. The CAIMS database is used to make logistic and strategic decisions and therefore must be accurate and up-to-date. ATRs are sent by both commands involved in a transfer of ordnance and by the accountable command for changes in condition or for other periodic or situational reports. Inaccurate ATRs can cause the affected ordnance to be categorized as "in transit" or "out-of-balance" and errors in the optically read Navy Message can prevent future ATR information to be recorded. The command score is tracked and reported monthly on the NOLSC Fleet Report Card. Other reports contain the value of incorrectly accounted ordnance. The Fleet Report Card grades the various major claimants and Type Commanders (TYCOMS) throughout the Navy based on ATRs submitted in five specific areas: out of balances; periodic lot reports; in transits; gains/losses; and ATR errors. NOLSC has established goals in each of the five areas based on Chief of Naval Operations (CNO) directives. In addition to exceeding Fleet Report Card dashboard goals, inaccurate ATRs can hinder the delivery of ordnance required to meet mission requirements. The submarine community has historically had problems in providing accurate ATRs to NOLSC requiring workarounds and other process accommodations to ensure mission requirements are met.

Project Sequence
In December 2004, Commander, Submarine Atlantic Fleet, (COMSUBLANT Code N7, Sponsor) requested Human Performance Center assistance in improving the accuracy of the Ammunition Transaction Reporting process. In March 2005, the Sponsor agreed with recommendations and asked for an executable plan. In June 2005, an Integrated Process

Team (IPT) started work on a Pilot Test for all submarines stationed in Norfolk, VA. In February 2006, after six months, the Pilot Test was evaluated as successful and an implementation plan was developed for the entire Undersea Enterprise (USE). Implementation is underway. The current status of full USE implementation will be presented in detail at the symposium.

BUSINESS ANALYSIS

The business analysis phase of the project was primarily focused on determining the link between the performance of the personnel actually executing the ATR process to the mission goals of the Submarine Force and the Navy and the impact of less-than-acceptable performance. The following table illustrates this link including the direct role resources play in the satisfactory execution of performance processes.

Resources	Tasks	Accomplishments	Business Goals
Personnel Training Tools Time Information Communication Process Policy Management	Generate ATR Make decisions Diagnose problems Inventory Follow procedures	Accurate reporting High FRC Score Trackable Inventory Confidence	Safety Ordnance Readiness POM Accuracy War Planning National Defense
Costs inflicted here **Intervene** here		**Value** produced here **Measure** here	

Table 1. Factors affecting performance linked to business goals.

The Submarine Community did not meet the CNO's goals for ATR accuracy and timeliness as promulgated in OPNAVINST 8015.2A. Inaccuracies in the ATR process within the Submarine Community created a compounding impact of over $37M per month on the Navy's ordnance inventory. This dollar figure represented the estimated amount of ordnance in the submarine arsenal that was not properly documented and whose location was technically unknown by NOLSC. Personnel in key positions had to incorporate additional measures to ensure this "unavailable" ordnance was in fact ready to meet mission requirements from a logistics perspective.

PERFORMANCE ANALYSIS

The analysis of actual performance included interviews, observations and document reviews spanning all aspects of the ATR process throughout the Submarine Community. The following aspects of the ATR process were analyzed: goals and requirements; process maps

for all locations and the six major procedures; historical data for all reporting command Fleet Report Cards since November 2000; training cost, impact and risk; resources and availability; and the future ATR vision of NOLSC, the ATR process owner. The King's Bay local Centralized Reporter's ATR performance far exceeded all other performers and became the benchmark or exemplar of desired performance. King's Bay was the only location that met the CNO's goals for ATR accuracy. In turn, King's Bay based submarines were the only submarines that consistently met the ordnance Fleet Report Card goals. Performers and processes at other submarine ports were compared and contrasted with King's Bay accomplishments. The following table lists the performance characteristics of the several locations.

FRC Category	Gains/ Losses	Out of Balances	In-Transits	ATR Errors	PLR Submitted	Overall
Weighting Factor	25%	25%	20%	15%	15%	
King's Bay	100.0	100.0	100.0	100.0	100.0	100.0
SUBPAC	98.7	91.0	92.9	99.2	94.5	95.9
Groton	97.6	89.7	98.1	97.5	65.5	91.2
Norfolk	100.0	88.3	96.8	92.1	58.4	89.7
Average	98.8	91.3	95.6	97.8	82.4	94.3

Table 2. Fleet Report Card results by location. (Standard is 100% in all categories.)

The process by which ATRs were submitted varied greatly across the USE. The following figures illustrate the processes and describe the salient characteristics of each.
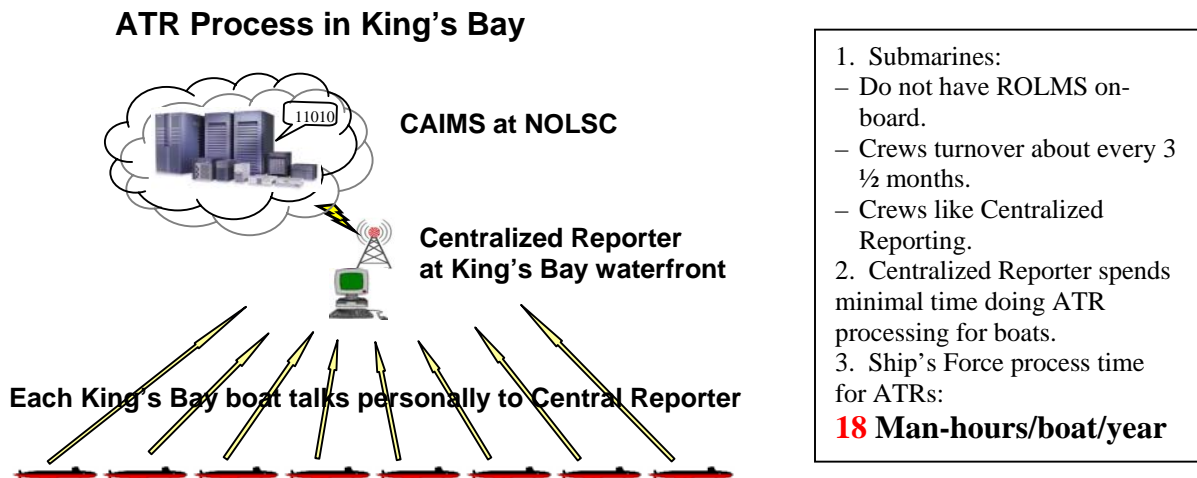

FIGURE 2. King's Bay ATR Process with characteristics.

ATR Process in SUBPAC

CAIMS at NOLSC

Centralized Reporter In Pearl Harbor

Each SUBPAC boat talks to regional Centralized Reporter via Naval Message.

Guam

San Diego

Pearl Harbor

Bangor

1. Submarines:
– Do not have ROLMS on-board. They use Ammo Stock Record Cards.
– Significant communication problems with submarines out of local area.
– Crews do not like regional Centralized Reporting.
2. Centralized Reporter spends 100% of his time doing ATR processing for boats.
3. Ship's Force process time for ATRs:

267 Man-hours/boat/year
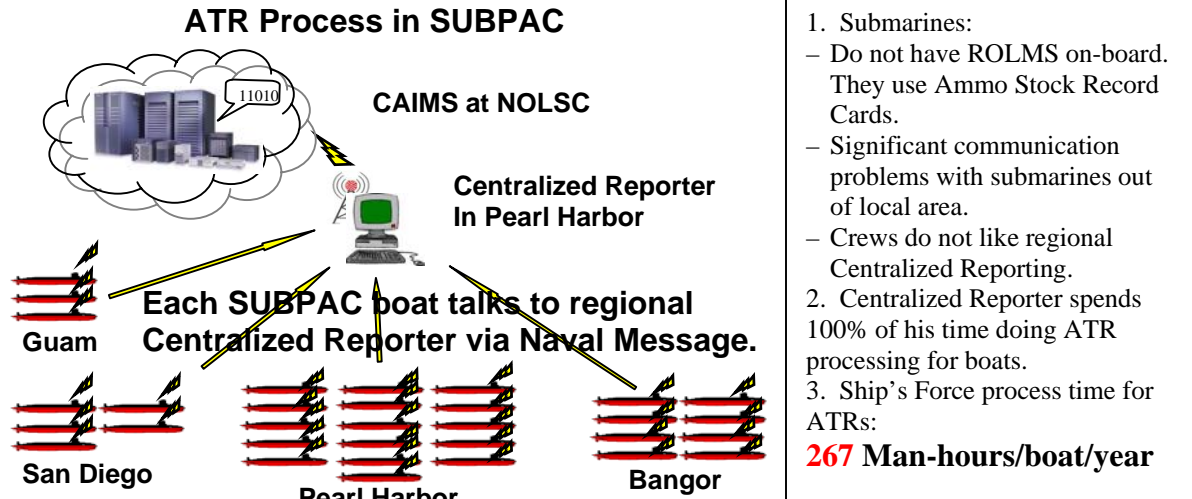
FIGURE 3. SUBPAC ATR Process with characteristics.

ATR Process in Groton and Norfolk

CAIMS at NOLSC

Each boat communicates with CAIMS directly via Naval Message.

Norfolk

Groton

1. Submarines:
– Do have ROLMS on-board. 40% of the hardware used to support ROLMS was in reduced reliability status.
– Significant communication problems between submarines and NOLSC.
– Crews do not like this process.
2. Ship's Force process time for ATRs:

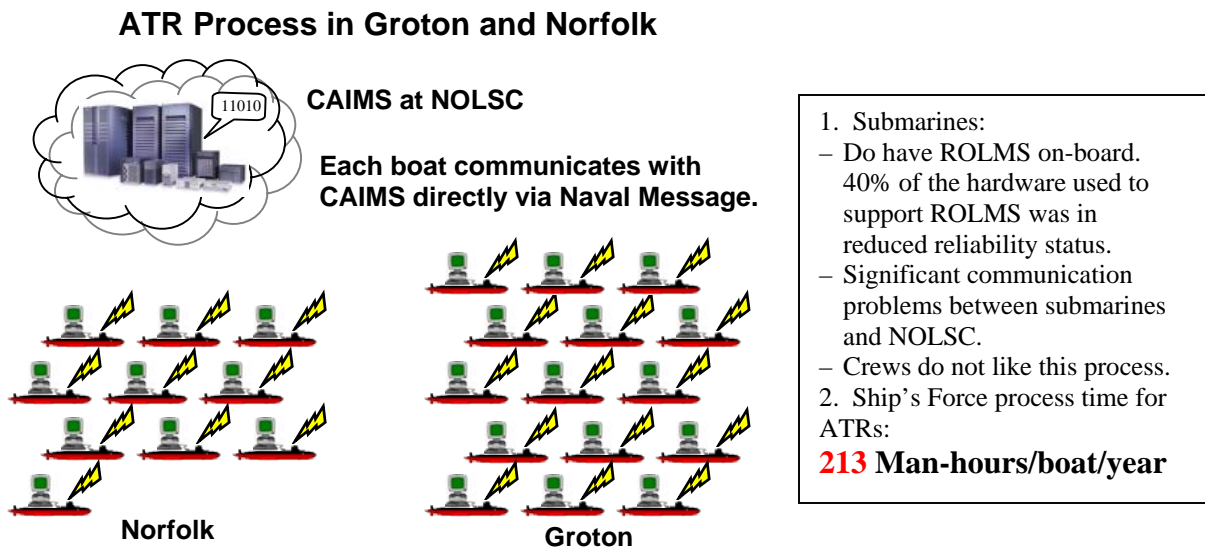**213 Man-hours/boat/year**

FIGURE 4. Groton/Norfolk ATR Process with characteristics.

Impact of training on performance

One of the key areas of our performance analysis focus dealt with the impact attendance at the available training venues had on Fleet Report Card scores. Two schools were offered to this performer group: (1) Ammunition Accounting, which generally taught the basis and need for accurate ordnance accounting procedures; and (2) ROLMS Data Base Administration, which taught the functionality of the software program used to track ordnance inventory at the command level.

For each command that had a school graduate, the FRC score trend was analyzed both before and after attendance. Our analysis took into account the learning curve exhibited by the new

graduate and used scores derived after some stability was assured (generally 3-4 months after the graduate reported back to their command). To obtain the "No School" results a similar timeframe was used with the same collateral duty person or supervisor in place at the command. Where possible, the period of analysis was six months. The below table describes the findings.

FRC Performance	Before	After
Ammunition Accounting	84.5	86.9
ROLMS DBA	85.5	86.4
No School	90.5	95.9

Table 3. Impact of training on FRC scores.

Attendance at the available schools was obviously not having the desired impact on FRC scores. Analysis indicated that experience alone provided the best improvement over time. The analysis also indicated that the duties of ordnance accounting on a submarine were performed by a Sailor fulfilling the Small Arms Petty Officer collateral duty. Since this collateral duty was essential in the career progression of a Sailor in the affected rate, turnover of this collateral duty was extremely high (generally annually). This is one key reason why expertise development and consistently high levels of performance was difficult to achieve.

CAUSE ANALYSIS
Submarine personnel have demonstrated they were unable to consistently meet the requirements of the ATR process for the following reasons:
1. Shipboard performers, command leadership, ISIC and TYCOM did not receive ordnance accounting and reporting performance feedback.
2. The ATR reporting process (other than that used at King's Bay) required significant expenditure of time and effort at the shipboard level. Correcting mistakes and resolving accounting issues was especially difficult due to continuous communication problems.
3. Submarines lacked adequate physical resources (hardware, software and continuous communication) to meet ATR requirements. Physical limitations in communicating with submarines at sea made it impossible for submarines to achieve performance and timeliness goals of ordnance reporting.
4. Shipboard performers did not have adequate knowledge and skills to effectively implement ordnance reporting largely due to limited opportunity to build proficiency and the steep process learning curve.
5. There were no incentives for shipboard personnel to achieve high levels of ordnance reporting performance.

INTERVENTION SELECTION
The following criteria were considered in selecting a recommended course of action:

1. Standardizing on a single process is desirable. Benefits of standard processes extend to improvements in:
   – Policy, instruction and shipboard enforcement.
   – ISIC and TYCOM oversight and inspection.
   – Training and advancement exams.
   – Learning curve for personnel that transfer between ports.
   – Expertise building of users and supervisors and collateral duty turnovers.
2. Action taken should correct the root causes while supporting COMSUBFOR goals and other requirements.
3. Action taken should ideally improve both productivity and accuracy of inventory reporting.
4. Action taken should be cost effective.
5. Action taken should anticipate future implementation requirements of OIS (Ordnance Information System).

Solution Possibilities
Four options were considered as possible solutions:
A. Standardize the ATR process across the entire community using the proven King's Bay model.
B. Standardize the ATR process across the entire community using either the SUBPAC or Groton/Norfolk model.
C. Correct the deficiencies in the SUBPAC and Groton/Norfolk to achieve ordnance accounting performance goals.
D. Accept the status quo.
   - Option D was not considered acceptable. The level of performance did not meet the CNO's goals for ordnance accounting and the Submarine Force stands out when compared to many other communities within the Navy.
   - Option C lacked the benefits of standardization and incurs the additional problems of Option B.
   - Option B had the potential to succeed; however, the cost of improvement and the risk of failure were expected to be high. All of the root causes listed above must be corrected to achieve the CNO's goals. Communications limitations alone limit the possibility of success. Additionally, the costs required to implement OIS onboard each submarine wee estimated to be unacceptably high (potentially more than $1M per year).
   - Option A was recommended as the best course of action.

INTERVENTION IMPLEMENTATION
Using the King's Bay model of a local Central Reporter, a reversible Pilot Test was conducted in Norfolk. The following diagram represents the sequence of actions taken to implement the Pilot Test.
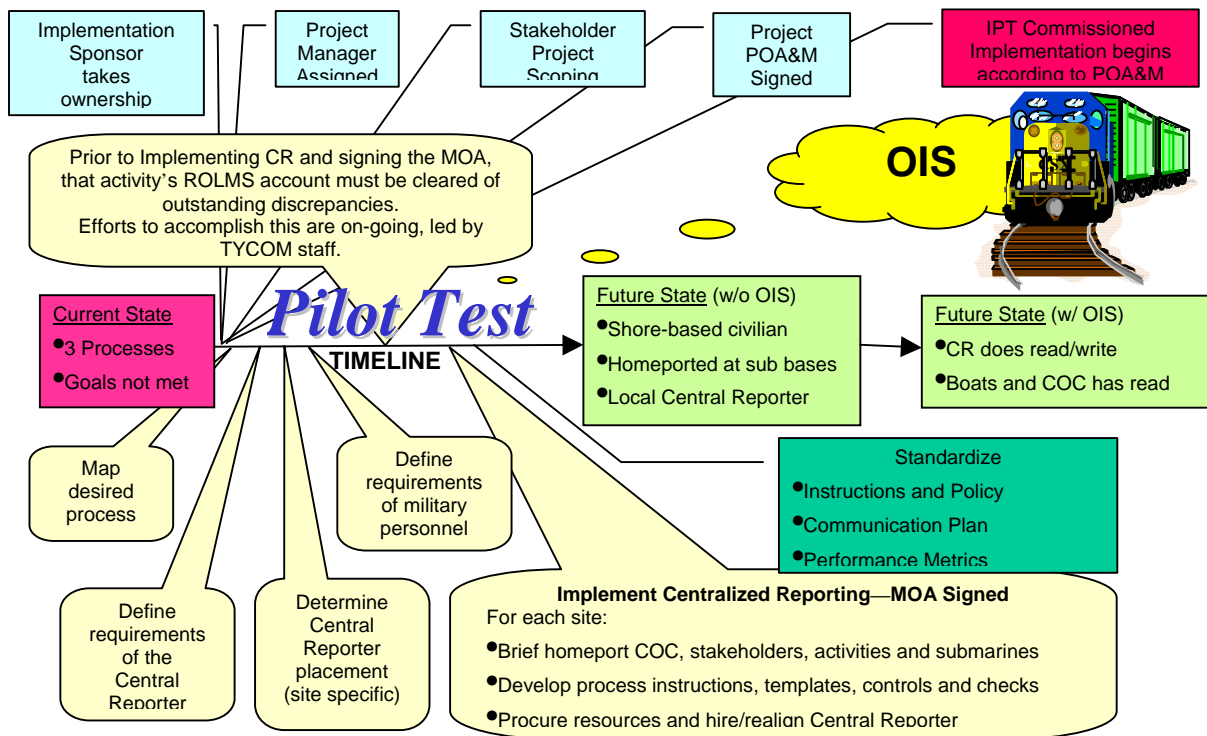
FIGURE 5. Pilot Test Implementation Sequence.

Pilot Test measures of success were established by the IPT. Those success criteria have been met. In addition, a satisfaction survey was administered to a statistically significant percentage of personnel in key billets affected by the Central Reporter Pilot Test. Those surveys indicate overwhelming positive response to the new processes. Based on the Pilot Test, actual and extrapolated benefits to the Submarine Force have been captured.

Immediate tangible benefits will be realized:

1. Sailors will have much more time using a local Central Reporter. An average of 196.5 hours will be returned to each boat per year. For boats that have just completed their transfer to Central Reporting, this is the most significant benefit they have noticed. This tremendous advantage, they find, directly impacts their ability to concentrate on higher priority tasking.
2. The Navy will benefit from lower school costs. COMSUBFOR will gain directly by not having to send an enlisted Petty Officer to a two week school every year per boat.
3. The Navy will benefit from professionals who provide consistent answers and support to the boats. Standardization of support will not only make the job easier for the Sailor who transfers between ports, but it will also help NOLSC/NAVSUP as they maintain the ordnance databases.
4. The Navy will benefit from lower IT costs. By transferring this function from the submarine to shore, COMSUBFOR will not only have fewer computers to procure and maintain, but they will be desktops and not ruggedized laptops.

Meeting the CNO's goals for ordnance accounting is also expected to have immediate intangible and long-range benefits that continue to be assessed:

1. Greater Sailor morale (performing higher priority tasks that directly affect mission);
2. Greater mission readiness and confidence in ordnance accounting accuracy and ordnance safety;
3. Greater POM accuracy including funding potential;
4. Lower adverse publicity, investigations and inspections;
5. Lower logistics costs; fewer emergent deliveries;
6. Lower administrative and support costs.

Based on a thorough evaluation of costs and benefits demonstrated by the Norfolk Pilot Test and benchmarking the performance standards set by King's Bay, the Human Performance Center has recommended implementation of the local Central Reporter system throughout the Submarine Community.

CONCLUSION

This paper describes a case study where the rigorous methodology of the HPSM was used to identify and solve problems with a specific process involving human systems integration within the submarine community. The instructions and procedures for ATR reporting are the same for all accountable commands within the Navy. The process of individual command reporting works well in those communities that have the capability of continuous communication and the billets for dedicated ordnance accounting personnel, such as much of the surface and air communities. The submarine community had unique challenges that were not adequately considered from a human integration perspective when the original ATR process was designed. For these reasons, the submarine community was placed at a distinct disadvantage based primarily on poor process design. The local central reporting system is anticipated to fully correct these problems. Based on the Pilot Test results and successes achieved, NOLSC is starting to implement these processes in other communities that face similar challenges.

ACKNOWLEDGEMENTS

Vance Kinsey, M.Ed., is a performance analyst at the Human Performance Center Detachment at the Submarine Learning Center and Commander, Submarine Force in Norfolk, VA. He is responsible for leading human performance improvement projects dealing primarily with workforce development and organizational leadership, and retired from the US Navy following a career in the submarine community. He received his M.Ed. in Adult Education/Curriculum & Instruction from the University of West Florida in Pensacola, FL.